Vaporstream®

Electric-to-Steam
Humidification System

PRODUCT CATALOG

DRISTEEM®
The humidification experts

Now with Vapor-logic®4 controller:

- Web-enabled access
- Interoperability via Modbus® or optional BACnet® MS/TP or LonTalk®

DRI-STEEM® offers a complete line of Vaporstream models to meet a wide range of humidification needs.

Application versatility

From providing comfort humidity to meeting the strictest clean-room requirements, the Vaporstream electric humidifier is an industrial-grade unit designed to meet the humidification demands of any building environment. Vaporstream models and options include multiple control capabilities, a broad capacity range, and compatibility with all water types.

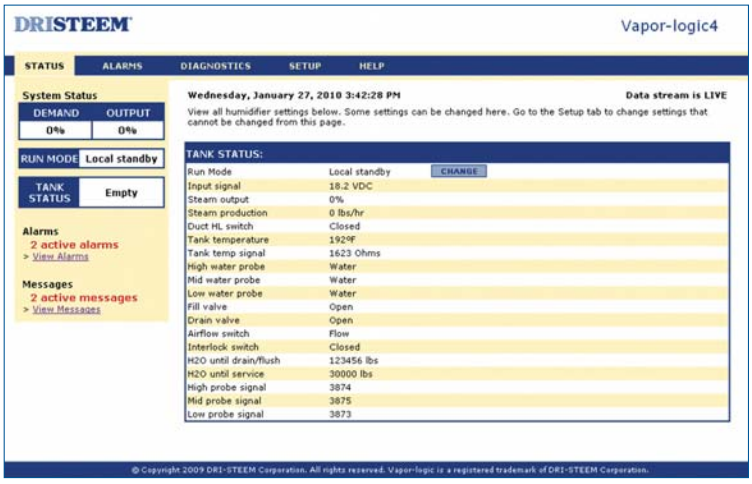
Precise control with Vapor-logic4

Vaporstream with Vapor-logic4 sets new standards for control in electric steam humidification:

Interoperability allows communication with building automation systems via Modbus or with optional BACnet MS/TP or LonTalk protocols.

Safety presets initiate fill and drain cycles and keep the humidifier cool and safe if sensed conditions, though unlikely, could be hazardous.

Web-enabled control allows you to set up, view, and adjust humidifier functions via Ethernet, either directly or remotely through a network.



Vaporstream features and benefits

Proven performance

- Consistent and reliable RH control to ±1%
- On-off or time-proportioned (TP) control for application control in most environments; solid-state relay (SSR) option for tighter control
- Electronically monitored water level ensures safe and reliable operation

Application flexibility

- Uses tap, softened, or DI/RO water
- Broad capacity range from 5.7 to 285 lbs/hr (2.6 to 129 kg/h), link up to 16 units for capacity up to 4560 lbs/hr (2068 kg/h)
- Dispersion options from an Area-type fan in open space to dispersion panels in ducts and air handlers meet a wide range of absorption requirements
- Designed to work with any voltage with a wide range of heater sizes, staging options, and model configurations
- Weather cover and climate-controlled outdoor enclosure options

Easy maintenance

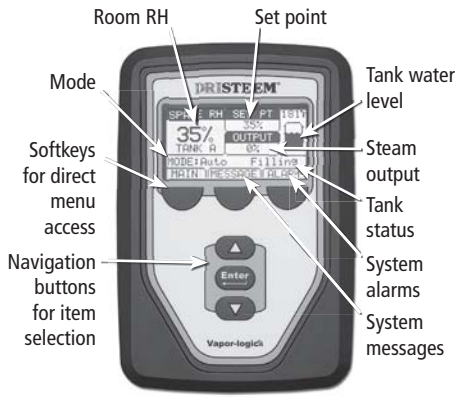
- Cleanout plate and removable cover provide inspection and service access
- Softened water significantly reduces maintenance requirements
- End-of-season autodrain minimizes microbial growth
- User-adjustable water skimmer skims off floating minerals
- Controller-operated drain and flush removes precipitated minerals from evaporating chamber
- Constant thermal expansion and contraction of heating elements continuously sheds mineral buildup
- Easy access to water level control — no components to remove

Additional options

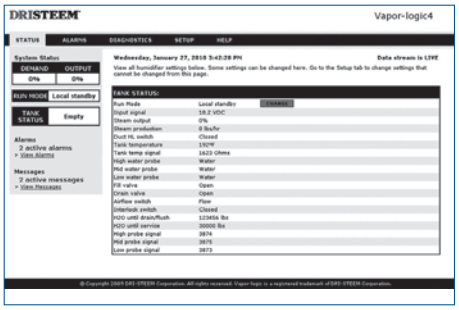
- 316 stainless steel construction
- Evaporating chamber insulation
- NEMA-4 control cabinet

Vapor-logic4 controller

Keypad/display



Web interface



Insert a USB flash drive into the Vapor-logic4 board's USB port to perform software updates, download data logs, and back up and restore data.

Accurate, responsive control

The Vapor-logic4 controller provides accurate, responsive RH control. PID control tunes the system for maximum performance.

Modbus, BACnet MS/TP, or LonTalk allow interoperability with multiple building automation systems. Modbus is standard, and BACnet MS/TP or LonTalk are available options.

Web interface provides the capability to set up, view, and adjust humidifier functions via Ethernet, either directly or remotely through a network.

Contactor wear leveling distributes cycles among multiple contactors for equal wear and longer contactor life.

Cycle counter triggers a message when it's time to replace contactors.

USB port allows easy firmware updates, and data backup and restore capability.

Real-time clock allows time-stamped alarm and message tracking, and accurate drain and flush scheduling.

Auxiliary temperature sensor/transmitter allows air temperature monitoring, such as in a duct, and enables temperature compensation to prevent window condensation.

Programmable outputs allow remote signaling and device activation.

Multiple-humidifier control allows staged control of up to 16 humidifiers with one controller.

Controller data, such as RH, air temperature, water use, energy use, alarms, and messages, can be downloaded to a PC for viewing and analysis. RH, alarms, and service messages can also be displayed via the keypad or Web interface..

Enhanced diagnostics include:

- **Test outputs** function using keypad or Web interface to verify component operation
- **Test humidifier** function using simulated demand to validate performance

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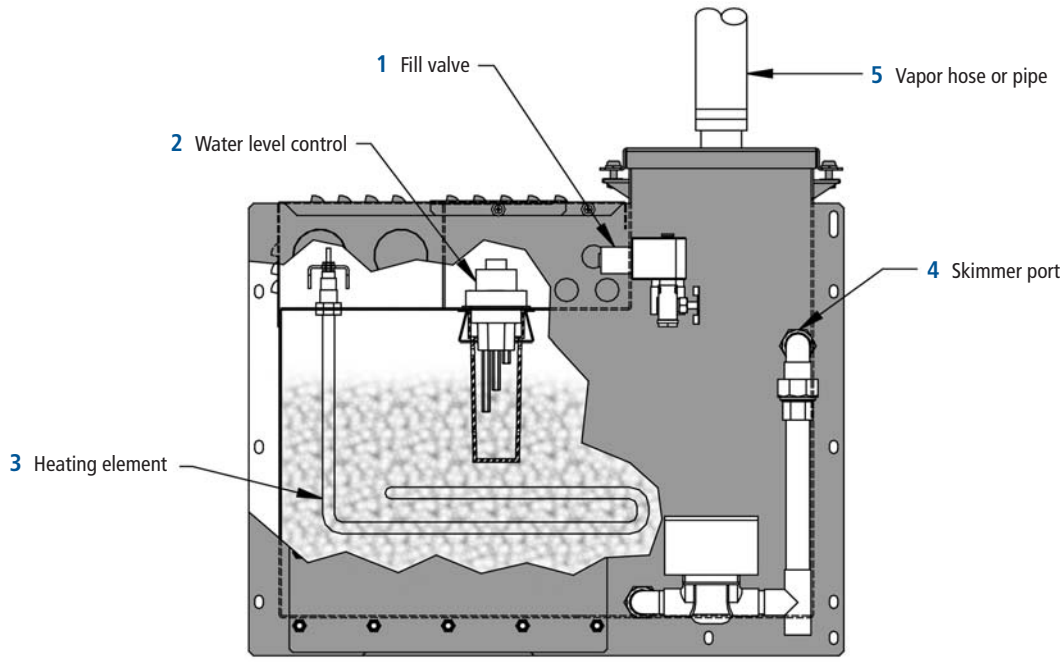
Figure 5-1:
Vaporstream principle of operation

Standard water system shown



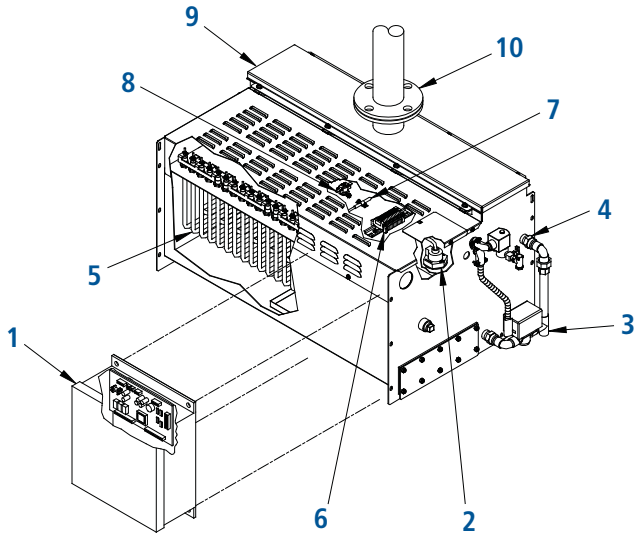
VLC-OM-002

1. When the system is first activated, the fill valve opens and the evaporating chamber fills with water to the operating level.
2. The operating level is maintained by the water level control.
3. On a call for humidity, the heating elements are energized, causing the water to boil. The fill valve opens and closes as needed to maintain the operating water level.
4. During refill in standard water systems, a portion of the surface water is skimmed off, carrying away precipitated minerals.

   DI/RO water systems (systems using deionized water or water that has been treated using reverse osmosis) do not require skimming.
5. Steam created in the evaporating chamber flows through vapor hose or piping to the dispersion assembly, where it is discharged into the airstream.

Figure 6-1:
Vapor-logic4 keypad/display

Figure 6-2:
Vaporstream components



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1. Vapor-logic4 controller

Vapor-logic4 controls all humidifier functions and can connect to a building automation system via Modbus or optional BACnet MS/TP or LonTalk. See Page 4 for more information.

2. Water level control

Tap or softened water systems control water levels electronically using a three-rod probe (Figure 7-1).

DI/RO water systems control water levels using a float valve (Figure 7-2) and low-water cutoff switch.

3. Drain

Duration and frequency of draining are user adjustable. To avoid possible stagnant water and microbial growth, the humidifier automatically drains if there is no call for humidity after a user-defined time period (72-hour default).

4. Water skimmer/overflow port

In standard water systems, the water skimmer reduces surface minerals in the evaporating chamber. Skimming occurs each time the humidifier fills. The skim time duration is user-adjustable.

In DI/RO water systems, skimming is not required; the skimmer port functions as an overflow port.

5. Heating elements

Low-watt-density Incoloy-sheathed heating elements ensure operation for many seasons. Constant expansion and contraction of heating elements sheds mineral scale. In the unlikely event of heater failure, heating elements can be removed easily.

6. Terminal strip

All control wiring connections at the humidifier can be made in this single location.

7. Temperature sensor

Mounted on the evaporating chamber, this sensor enables:

- Over-temperature protection
- Freeze protection
- Preheating, allowing rapid response to a call for humidity

8. Over-temperature thermostat

This safety device shuts down the humidifier if it becomes too hot. This is one of three levels of safety protection that also includes the temperature sensor and the water level control system.

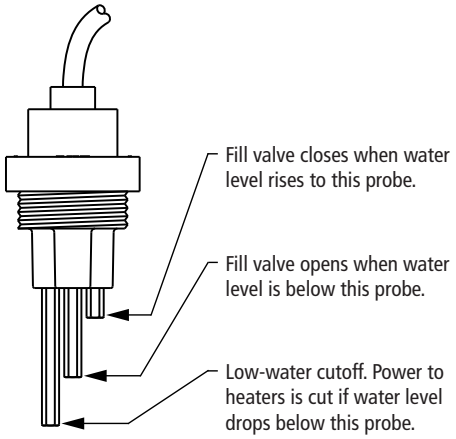
9. Service access

Access cover allows periodic inspection and servicing of the evaporating chamber.

10. Steam outlet

Steam generated in the humidifier rises through the steam outlet and travels to the dispersion assembly through vapor hose or piping.

Figure 7-1:
Water level control for standard-water humidifier


Fill valve closes when water level rises to this probe.
Fill valve opens when water level is below this probe.
Low-water cutoff. Power to heaters is cut if water level drops below this probe.

Humidifiers using tap or softened water control water levels electronically using a three-rod probe. The controller responds with the above actions when the water level reaches each rod.

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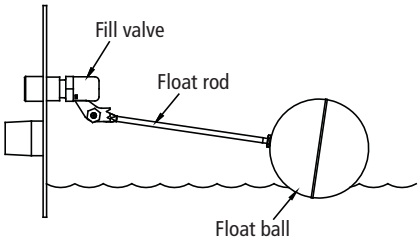
Figure 7-2:
Water level control for DI/RO-water humidifier



Humidifiers using DI/RO water control water levels using a float valve and low-water cutoff switch.

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Vaporstream capacities and electrical specifications

Table 8-1:
Vaporstream VLC capacities and electrical specifications, standard water and DI/RO water

Model (kW-stages)	Maximum steam capacity †		Heaters		Current draw (amps)											kW
					Single-phase						Three-phase***					
	lbs/hr	kg/h	Qty.	Stages**	120V	208V*	240V*	277V*	480V*	600V*	208V*	240V*	277V*	480V*	600V*	
2-1	5.7	2.6	1	1	16.7	9.6	8.3	7.2	4.2	3.3	—	—	—	—	—	2
3-1	8.6	3.9	1	1	25.0	14.4	12.5	10.8	6.3	5.0	—	—	—	—	—	3
4-1	11.4	5.2	1	1	33.3	19.2	16.7	14.4	8.3	6.7	—	—	—	—	—	4
5-1	15.2	6.9	1	1	44.4	25.6	22.2	19.2	11.1	8.9	—	—	—	—	—	5.33
6-1	17.1	7.8	3	1	—	28.8	25.0	21.7	12.5	10.0	16.7	14.4	12.5	7.2	5.8	6
9-1	25.7	11.7	3	1	—	43.3	37.5	32.5	18.8	15.0	25.0	21.7	18.8	10.8	8.7	9
12-1	34.2	15.5	3	1	—	—	—	43.3	25.0	20.0	33.3	28.9	25.0	14.4	11.5	12
16-1	45.6	20.7	3	1	—	—	—	—	33.3	26.7	44.4	38.5	33.3	19.2	15.4	16
21-1	59.9	27.2	3	1	—	—	—	—	43.8	35.0	—	—	43.8	25.3	20.2	21
25-1	71.3	32.3	3	1	—	—	—	—	—	41.7	—	—	—	30.1	24.1	25
12-2	34.2	15.5	6	2	—	57.7	50.0	43.3	25.0	20.0	33.3	28.9	25.0	14.4	11.5	12
18-2	51.3	23.3	6	2	—	86.5	75.0	65.0	37.5	30.0	50.0	43.3	37.5	21.7	17.3	18
24-2	68.4	31.0	6	2	—	—	—	86.6	50.0	40.0	66.6	57.7	50.0	28.9	23.1	24
32-2	91.2	41.4	6	2	—	—	—	—	66.7	53.3	88.8	77.0	66.7	38.5	30.8	32
42-2	119.7	54.3	6	2	—	—	—	—	87.5	70.0	—	—	87.5	50.5	40.4	42
50-2	142.5	64.6	6	2	—	—	—	—	—	83.3	—	—	—	60.1	48.1	50
18-3	51.3	23.3	9	3	—	86.5	75.0	65.0	37.5	30.0	50.0	43.3	37.5	21.7	17.3	18
27-3	77.0	34.9	9	3	—	129.8	112.5	97.5	56.3	45.0	74.9	65.0	56.3	32.5	26.0	27
36-3	102.6	46.5	9	3	—	—	—	130.0	75.0	60.0	99.9	86.6	75.0	43.3	34.6	36
48-3	136.8	62.1	9	3	—	—	—	—	100.0	80.0	133.2	115.5	100.0	57.7	46.2	48
63-3	179.6	81.5	9	3	—	—	—	—	131.3	105.0	—	—	131.3	75.8	60.6	63
75-3	213.8	97.0	9	3	—	—	—	—	—	125.0	—	—	—	90.2	72.2	75
24-4	68.4	31.0	12	4	—	115.4	100.0	86.6	50.0	40.0	66.6	57.7	50.0	28.9	23.1	24
36-4	102.6	46.5	12	4	—	173.1	150.0	130.0	75.0	60.0	99.9	86.6	75.0	43.3	34.6	36
48-4	136.8	62.1	12	4	—	—	—	173.3	100.0	80.0	133.2	115.5	100.0	57.7	46.2	48
64-4	182.4	82.7	12	4	—	—	—	—	133.3	106.7	177.6	154.0	133.4	77.0	61.6	64
84-4	239.4	108.6	12	4	—	—	—	—	175.0	140.0	—	—	175.1	101.0	80.8	84
100-4	285.0	129.3	12	4	—	—	—	—	—	166.7	—	—	—	120.3	96.2	100

* If using an optional SDU or Area-type fan unit for dispersion, run a neutral line with 208V/240V/single-phase and 208V/three-phase power supply lines to provide a 120V circuit for the fan. With all other power supply voltages (other than 120V), provide a separate 120V circuit for the fan, or order from DRI-STEEM a transformer installed in the control cabinet.

** Heater stage identifies the number of contactors.

*** Three-phase power supply connection. All heater loads are wired Delta.

† Total humidifier load = load to meet design conditions + load to compensate for steam loss from the dispersion assembly and interconnecting piping. If total humidifier load is more than the humidifier's maximum capacity, design conditions will not be met. For steam loss data see the *DRI-STEEM Design Guide* available for downloading and printing at www.dristeem.com

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Vaporstream weights and cabinet sizes

Table 9-1:
Vaporstream VLC weights and control cabinet sizes, standard water and DI/RO water

Model (kW-stages)	Shipping weight		Operating weight †		Control cabinet size* (M, L, XL, XXL)										
					Single-phase power						Three-phase power				
	lbs	kg	lbs	kg	120V	208V	240V	277V	480V	600V	208V	240V	277V	480V	600V
2-1	35	16	79	36	M	M	M	M	M	M	—	—	—	—	—
3-1	35	16	79	36	M	M	M	M	M	M	—	—	—	—	—
4-1	35	16	79	36	M	M	M	M	M	M	—	—	—	—	—
5-1	35	16	79	36	M	M	M	M	M	M	—	—	—	—	—
6-1	57	26	157	71	—	M	M	M	M	M	M	M	M	M	M
9-1	57	26	157	71	—	M	M	M	M	M	M	M	M	M	M
12-1	57	26	157	71	—	—	—	M	M	M	M	M	M	M	M
16-1	57	26	157	71	—	—	—	—	M	M	M	M	M	M	M
21-1	57	26	157	71	—	—	—	—	M	M	—	—	M	M	M
25-1	57	26	157	71	—	—	—	—	—	M	—	—	—	M	M
12-2	79	36	237	108	—	L	L	L	L	L	L	L	L	L	L
18-2	79	36	237	108	—	L	L	L	L	L	L	L	L	L	L
24-2	79	36	237	108	—	—	—	L	L	L	L	L	L	L	L
32-2	79	36	237	108	—	—	—	—	L	L	L	L	L	L	L
42-2	79	36	237	108	—	—	—	—	L	L	—	—	L	L	L
50-2	79	36	237	108	—	—	—	—	—	L	—	—	—	L	L
18-3	110	50	326	148	—	L	L	L	L	L	L	L	L	L	L
27-3	110	50	326	148	—	XL	L	L	L	L	L	L	L	L	L
36-3	110	50	326	148	—	—	—	XL	L	L	L	L	L	L	L
48-3	110	50	326	148	—	—	—	—	L	XXL	XL	L	L	L	L
63-3	110	50	326	148	—	—	—	—	XL	XXL	—	—	L	L	L
75-3	110	50	326	148	—	—	—	—	—	XXL	—	—	—	L	XXL
24-4	153	70	427	194	—	L	L	L	L	L	L	L	L	L	L
36-4	153	70	427	194	—	XL	XL	XL	L	L	L	L	L	L	L
48-4	153	70	427	194	—	—	—	XL	L	L	XL	L	L	L	L
64-4	153	70	427	194	—	—	—	—	XL	XXL	XL	XL	XL	L	L
84-4	153	70	427	194	—	—	—	—	XL	XXL	—	—	XL	L	L
100-4	153	70	427	194	—	—	—	—	—	XXL	—	—	—	L	XXL

* Control cabinet sizes in this table are for the largest required cabinet for each model. Depending on Vaporstream options chosen you may receive a smaller cabinet than the one shown in this table. Contact DRI-STEEM if you need more detailed information about control cabinet sizes. See control cabinet dimensions in the next section.

† Operating weight does not include control cabinet. See control cabinet weights in the next section.

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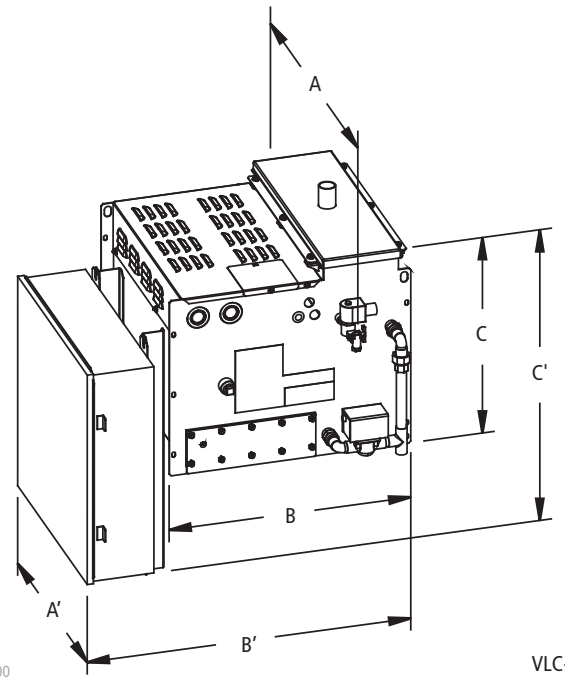
Vaporstream dimensions

Figure 10-1:
Vaporstream VLC dimensions, standard water and DI/RO water



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VLC-OM-039

Table 10-1:
Vaporstream VLC dimensions, standard water and DI/RO water

Model (kW - stages)	Without mounted control cabinet					
	A (length)		B (width)		C (height)	
	inches	mm	inches	mm	inches	mm
2-1, 3-1, 4-1, 5-1	12.52	318	26.00	660	18.88	480
6-1, 9-1, 12-1, 16-1, 21-1, 25-1	17.85	453	22.00	559	18.88	480
12-2, 18-2, 24-2, 32-2, 42-2, 50-2	25.35	644	22.00	559	18.88	480
18-3, 27-3, 36-3, 48-3, 63-3, 75-3	32.85	834	22.00	559	18.88	480
24-4, 36-4, 48-4, 64-4, 84-4, 100-4	40.35	1025	22.00	559	18.88	480

Model (kW - stages)	With mounted control cabinet option						
	Max. control cabinet size	A' (length 2)		B' (width 2)		C' (height 2)	
		inches	mm	inches	mm	inches	mm
2-1, 3-1, 4-1, 5-1	M	14.75	375	34.00	864	30.31	770
6-1, 9-1, 12-1, 16-1, 21-1, 25-1	M	25.00	635	30.00	762	30.31	770
12-2, 18-2, 24-2, 32-2, 42-2, 50-2	L	29.00	737	30.00	762	34.11	866
18-3, 27-3, 36-3, 48-3, 63-3, 75-3	XXL	32.85	834	32.00	813	46.11	1171
24-4, 36-4, 48-4, 64-4, 84-4, 100-4	XXL	40.35	1025	32.00	813	46.11	1171

Notes:
- For all Vaporstream models with optional insulation, add 1" (25 mm) to dimensions A, C, and C'.
- Dimensions are largest possible for these models. Actual dimensions may be smaller.

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Vaporstream control cabinets

Control cabinet features

The standard Vaporstream control cabinet is an ETL- and C-ETL-listed NEMA-12 cabinet and is shipped loose. Control cabinet options include:

- Factory mounting on humidifier
- NEMA-4 cabinet
- Cabinet door interlock switch
- Cabinet door lock

The control cabinet's size is based on capacity and system options. See Table 11-1 below and Table 9-1 for cabinet sizing by model.

The control cabinet can be mounted up to 50' (15 m) from the Vaporstream. The keypad can be mounted up to 500' (152 m) from the control cabinet. (Distances are based on wire/cable lengths.)

Figure 11-1:
Vaporstream model 6-1 with mounted control cabinet

Table 11-1:
Standard control cabinet dimensions and weights

Cabinet size	Cabinet dimensions		Shipping weight*	
	inches	mm	lbs	kg
S	16 h x 14 w x 6 d	406 h x 356 w x 152 d	32	15
M	20 h x 20 w x 7 d	508 h x 508 w x 178 d	55	25
L	24 h x 24 d x 7 d	610 h x 610 w x 178 d	73	33
XL	30 h x 24 w x 9 d	762 h x 610 w x 229 d	91	41
XXL	36 h x 30 w x 9 d	914 h x 762 w x 229 d	136	62

* Weight does not include humidifier.

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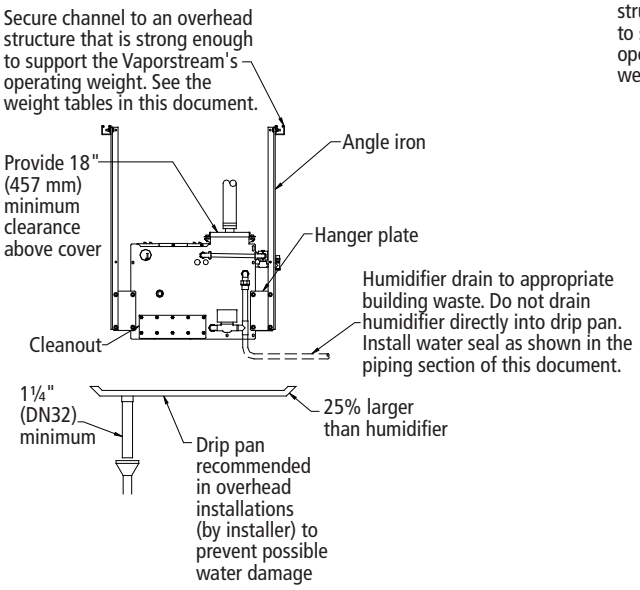
Figure 12-1: Trapeze hanger

Vaporstream Models 2-1 through 5-1


Secure channel to an overhead structure that is strong enough to support the Vaporstream's operating weight. See the weight tables in this document.
Angle iron
Provide 18" (457 mm) minimum clearance above cover
Hanger plate
Humidifier drain to appropriate building waste. Do not drain humidifier directly into drip pan. Install water seal as shown in the piping section of this document.
Cleanout
1¼" (DN32) minimum
25% larger than humidifier
Drip pan recommended in overhead installations (by installer) to prevent possible water damage

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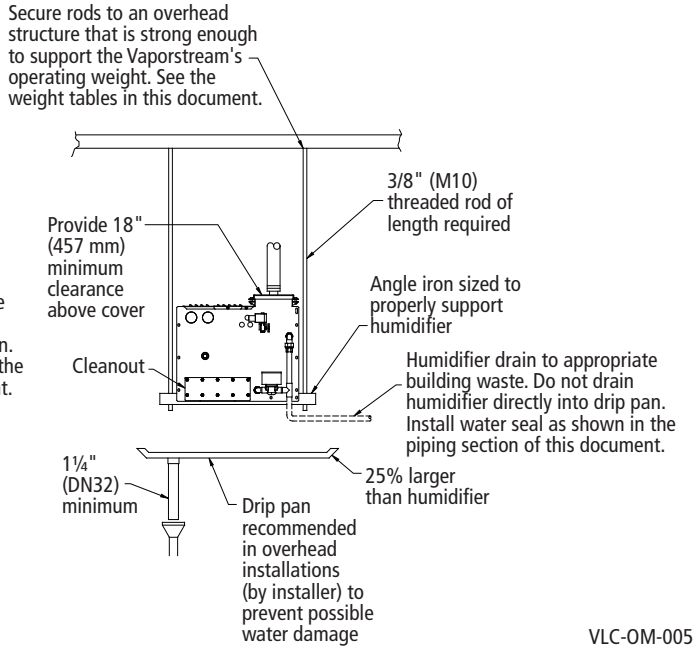
Vaporstream Models 6-1 through 100-4


Secure rods to an overhead structure that is strong enough to support the Vaporstream's operating weight. See the weight tables in this document.
3/8" (M10) threaded rod of length required
Provide 18" (457 mm) minimum clearance above cover
Angle iron sized to properly support humidifier
Cleanout
Humidifier drain to appropriate building waste. Do not drain humidifier directly into drip pan. Install water seal as shown in the piping section of this document.
1¼" (DN32) minimum
25% larger than humidifier
Drip pan recommended in overhead installations (by installer) to prevent possible water damage

VLC-OM-005

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Table 12-1: Mounting options by model

Mounting method	Models			
	2-1, 3-1, 4-1, 5-1		All other models	
	Standard	Optional	Standard	Optional
Trapeze	X		X	
Support legs				X
Wall brackets	X			X
Weather cover		X		X
Outdoor enclosure		X		X

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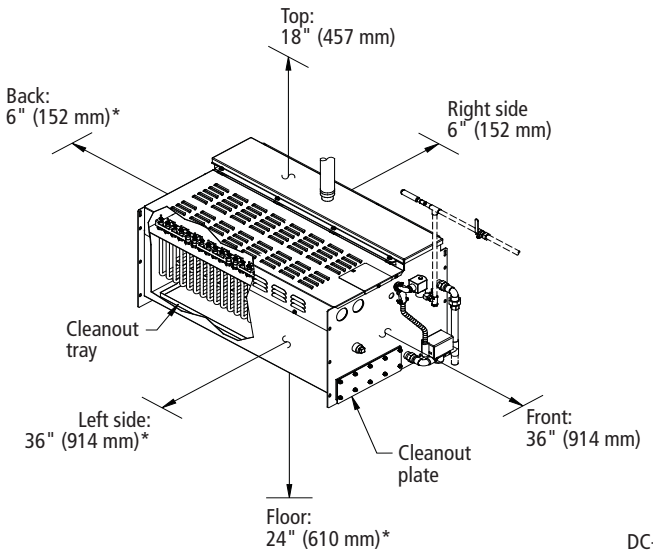
Figure 12-2: Vaporstream clearance recommendations



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* When the control cabinet is mounted on the Vaporstream, provide 36" (914 mm) clearance from the front of the control cabinet and 6" (152 mm) from the bottom of the cabinet to the floor.

mc_022310_1350

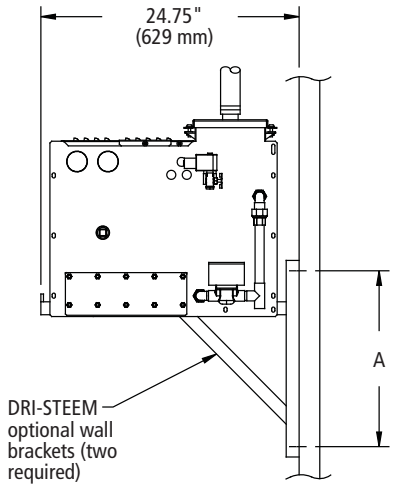
Table 13-1:
Wall brackets Dimension A (center to center of mounting holes)

Vaporstream model	inches	mm
One-heater models: 2-1, 3-1, 4-1, 5-1	17	432
Three-heater models: 6-1, 9-1, 12-1, 16-1, 21-1, 25-1	17	432
Six-heater models: 12-2, 18-2, 24-2, 32-2, 42-2, 50-2	17	432
Nine-heater models*: 18-3, 27-3, 36-3, 48-3, 63-3, 75-3	28	711
Twelve-heater models*: 24-4, 36-4, 48-4,64-4, 84-4, 100-4	34	864

* Wall bracket installation on metal stud walls is not recommended for nine-heater and twelve-heater models.

mc_022310_1345

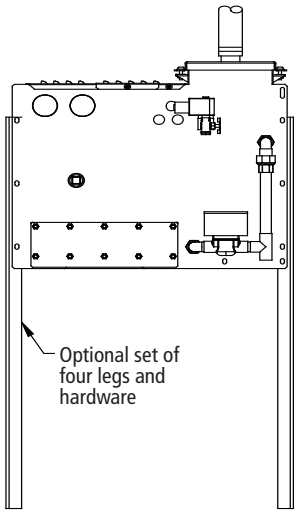
Figure 13-1:
Wall brackets



mc_022310_1351

VLC-OM-007

Figure 13-2:
Support legs

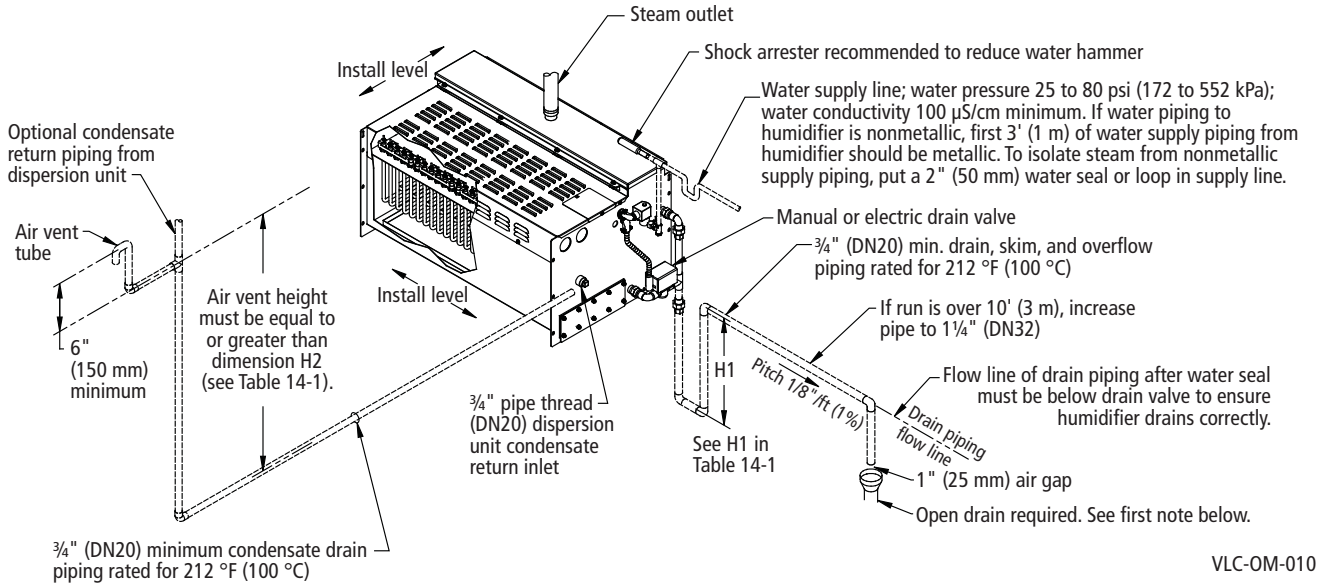


mc_022310_1355

VLC-OM-006

Vaporstream VLC piping: Standard water

Figure 14-1:
Field piping overview, Vaporstream VLC with standard water


Steam outlet
Shock arrester recommended to reduce water hammer
Install level
Water supply line; water pressure 25 to 80 psi (172 to 552 kPa); water conductivity 100 µS/cm minimum. If water piping to humidifier is nonmetallic, first 3' (1 m) of water supply piping from humidifier should be metallic. To isolate steam from nonmetallic supply piping, put a 2" (50 mm) water seal or loop in supply line.
Optional condensate return piping from dispersion unit
Air vent tube
Manual or electric drain valve
¾" (DN20) min. drain, skim, and overflow piping rated for 212 °F (100 °C)
Air vent height must be equal to or greater than dimension H2 (see Table 14-1).
Install level
If run is over 10' (3 m), increase pipe to 1¼" (DN32)
6" (150 mm) minimum
H1
Pitch 1/8"/ft (1%)
Flow line of drain piping after water seal must be below drain valve to ensure humidifier drains correctly.
Drain piping flow line
¾" pipe thread (DN20) dispersion unit condensate return inlet
See H1 in Table 14-1
1" (25 mm) air gap
Open drain required. See first note below.
¾" (DN20) minimum condensate drain piping rated for 212 °F (100 °C)
VLC-OM-010

Notes:

- Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.
- Offset humidifier from floor drain to prevent flash steam from rising into the humidifier.
- Dashed lines indicate provided by installer.
- The water supply inlet is more than 1" (25 mm) above the skim/overflow port, eliminating the possibility of backflow or siphoning from the tank. No additional backflow prevention is required; however, governing codes prevail.
- Damage caused by chloride corrosion is not covered by your DRI-STEEM warranty.

mc_022310_1255

Figure 14-2:
Piping, Vaporstream VLC with standard water, Models 2-1 through 5-1

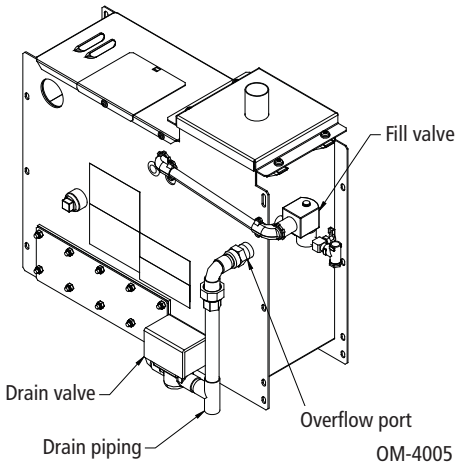


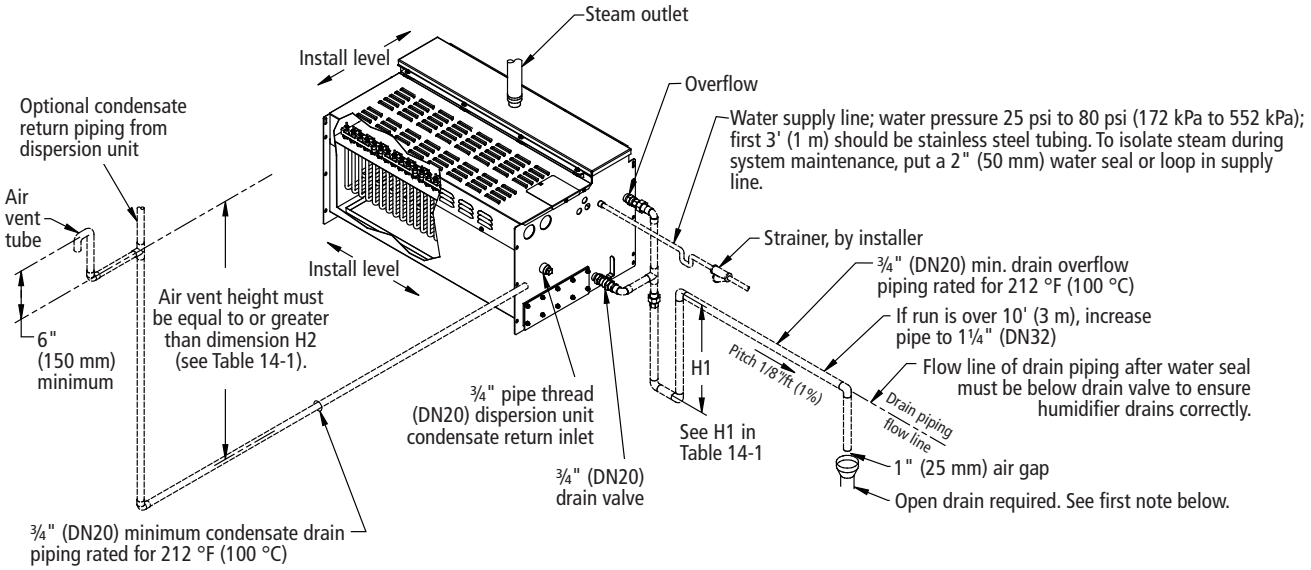
Table 14-1:
Heights required to overcome Vaporstream internal pressure (H1, H2)

Unit output			Water seal height (H1)		Air vent height (H2)	
kW	lbs/hr	kg/h	inches	mm	inches	mm
≤ 48	≤ 138	≤ 62	12	305	22.5	572
49-64	139–183	63–83	15	381	27.5	699
> 64	> 183	> 83	18	457	30.5	775

mc_022310_1325

Vaporstream VLC piping: DI/RO water

Figure 15-1: Field piping overview, Vaporstream VLC with DI/RO water


Steam outlet
Install level
Overflow
Optional condensate return piping from dispersion unit
Water supply line; water pressure 25 psi to 80 psi (172 kPa to 552 kPa); first 3' (1 m) should be stainless steel tubing. To isolate steam during system maintenance, put a 2" (50 mm) water seal or loop in supply line.
Air vent tube
Strainer, by installer
¾" (DN20) min. drain overflow piping rated for 212 °F (100 °C)
Install level
Air vent height must be equal to or greater than dimension H2 (see Table 14-1).
If run is over 10' (3 m), increase pipe to 1¼" (DN32)
6" (150 mm) minimum
H1
Pitch 1/8"/ft (1%)
Flow line of drain piping after water seal must be below drain valve to ensure humidifier drains correctly.
Drain piping flow line
¾" pipe thread (DN20) dispersion unit condensate return inlet
See H1 in Table 14-1
1" (25 mm) air gap
¾" (DN20) drain valve
Open drain required. See first note below.
¾" (DN20) minimum condensate drain piping rated for 212 °F (100 °C)

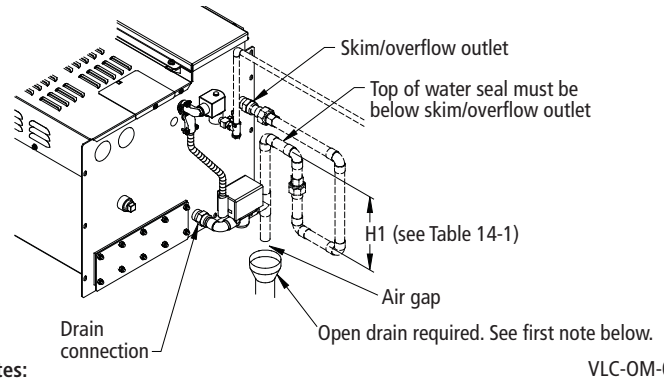
VLC-OM-011

Notes:

- Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.
- Offset humidifier from floor drain to prevent flash steam from rising into the humidifier.
- Dashed lines indicate provided by installer.
- The water supply inlet is more than 1" (25 mm) above the overflow port, eliminating the possibility of backflow or siphoning from the tank. No additional backflow prevention is required; however, governing codes prevail.
- Damage caused by chloride corrosion is not covered by your DRI-STEEM warranty.

mc_022310_1300

Figure 15-2: Alternate water seal and drain valve piping

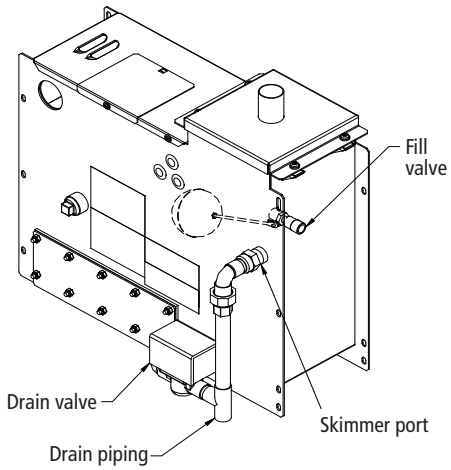

Skim/overflow outlet
Top of water seal must be below skim/overflow outlet
H1 (see Table 14-1)
Air gap
Drain connection
Open drain required. See first note below.

VLC-OM-012

Notes:

- Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.
- Use this piping configuration when water seal must be elevated above flow line of drain connection, such as when the humidifier is mounted near the floor.
- Dashed lines indicate provided by installer

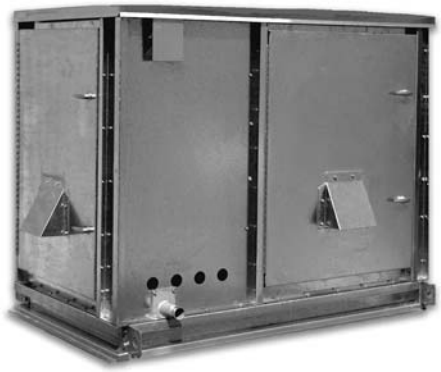
Figure 15-3: Piping, Vaporstream VLC with DI/RO water, Models 2-1 through 5-1



OM-4004

Vaporstream outdoor enclosure overview

Figure 16-1: Outdoor enclosure



Install a Vaporstream humidifier virtually anywhere. This pre-packaged, factory-installed unit ships complete to the job site, ready for easy-to-connect water and electrical connections.

Outdoor humidifier operation in any climate is possible with the DRI-STEEM outdoor enclosure. The prepiped, factory-assembled unit ships complete to the job site. Installation is a snap with various mounting options — curb, legs, or flush.

Factory constructed and assembled. The outdoor enclosure is shipped complete with the humidifier preinstalled and tested. The humidifier is prepiped within the enclosure with an integral water seal, ready for quick connection to water, steam and electricity.

Install on the ground or on the roof. Outdoor enclosures are ideal for facilities that have limited interior space.

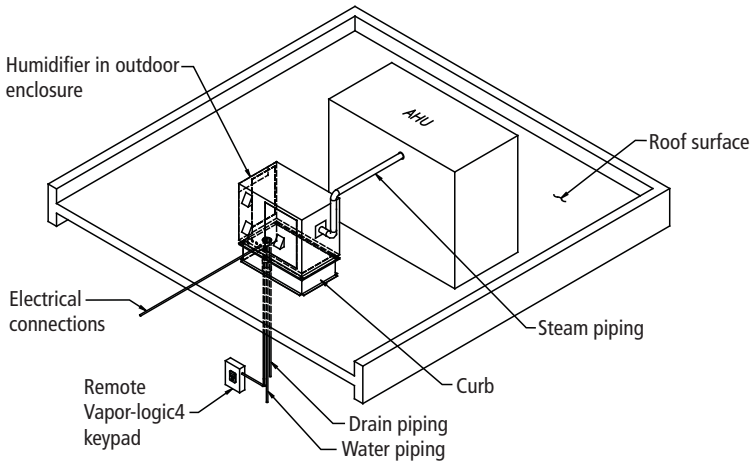
Certified, tested and proven. In-house testing and numerous successful installations have proven that the outdoor enclosure provides reliable operation under extreme conditions.

Easy access for service. Steel enclosure doors provide full access to internal components. The doors feature stainless steel hinges, and the latches operate from outside and inside of the unit.

Protects in cold and hot climates. To ensure complete safety and operation in all climates, the outdoor enclosure has supplemental heating and ventilating systems that automatically maintain required operation conditions. DRI-STEEM humidifiers housed in outdoor enclosures operate properly when outdoor temperatures range from −40 °F to 122 °F (−40 °C to 50 °C).

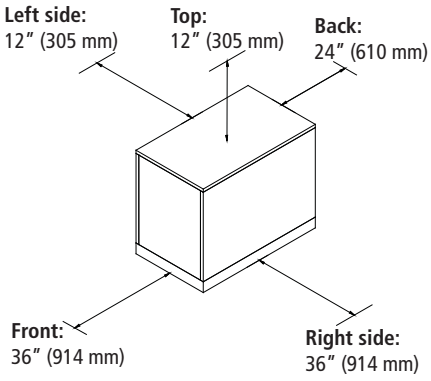
Robust design. The outdoor enclosure is ruggedly built to completely protect internal components. The enclosure is constructed of heavy-duty galvanized steel and is fully insulated. Gaskets on doors ensure a tight seal.

Figure 17-1:
Typical rooftop installation overview



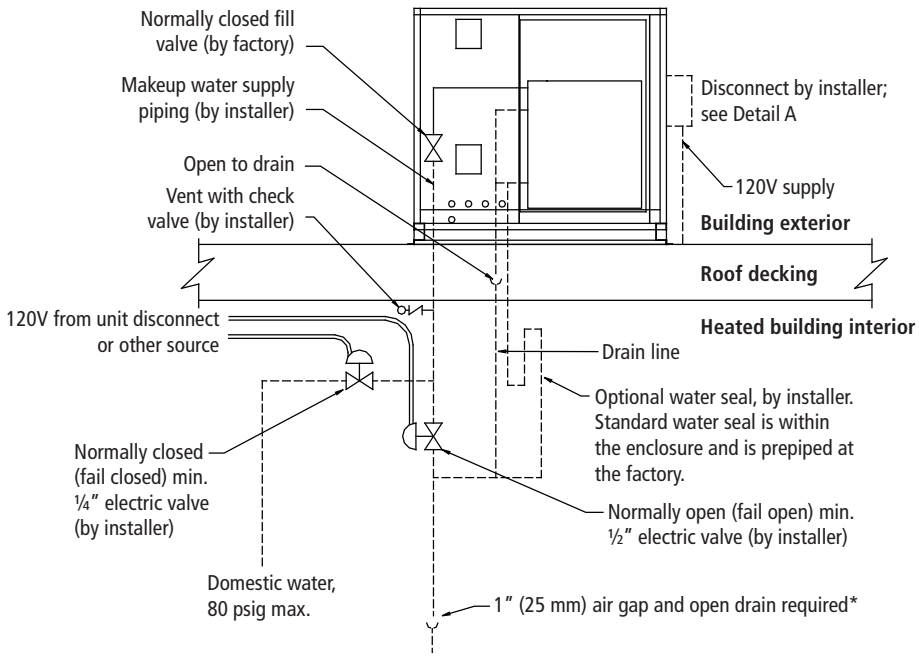
OM-7464

Figure 17-2:
Outdoor enclosure clearances

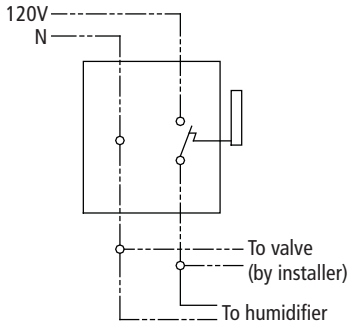


OM-955

Figure 17-3:
Optional installation method for water supply piping


Normally closed fill valve (by factory)
Makeup water supply piping (by installer)
Open to drain
Vent with check valve (by installer)
120V from unit disconnect or other source
Disconnect by installer; see Detail A
120V supply
Building exterior
Roof decking
Heated building interior
Drain line
Optional water seal, by installer. Standard water seal is within the enclosure and is prepiped at the factory.
Normally closed (fail closed) min. ¼″ electric valve (by installer)
Normally open (fail open) min. ½″ electric valve (by installer)
Domestic water, 80 psig max.
1″ (25 mm) air gap and open drain required*

Detail A: Disconnect box

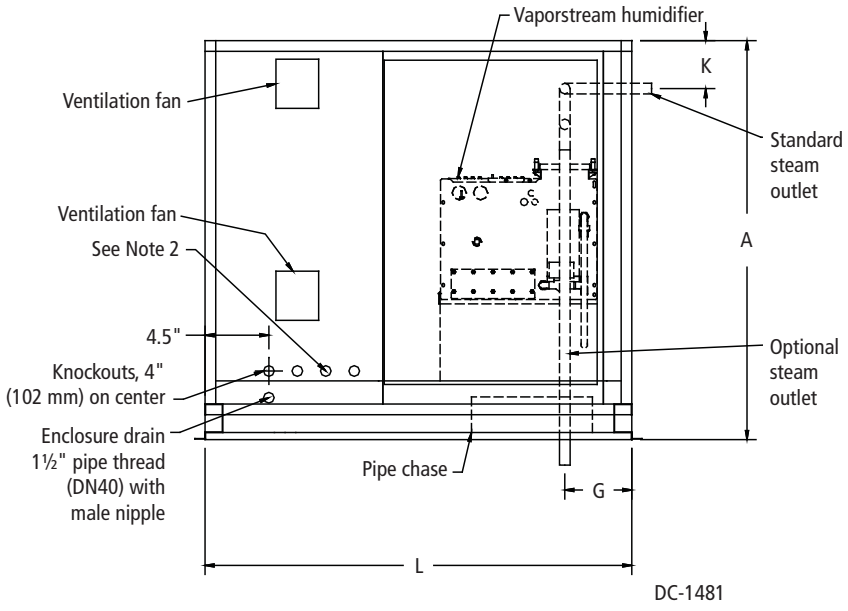


* Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensate may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.

OM-954

mc_030410_1515

Figure 18-1:
Vaporstream outdoor enclosure with standard or optional steam outlet, elevation view



mc_030410_1500

Notes:

1. The outdoor enclosure has two available steam distribution configurations:

   The standard configuration has a steam outlet at the back of the outdoor enclosure for connecting to steam dispersion unit piping.

   The optional internal steam distribution configuration routes steam within the outdoor enclosure and down through the enclosure pipe chase into a building.

2. There are four knockouts located on the right and left side of the enclosure. Knockout sizes are 1½" (hole dia. 50 mm) for Vaporstream models with 1-6 heaters and 2" (hole dia. 63.5 mm) for Vaporstream models with 9-12 heaters. Run the electrical power into the enclosure at these knockouts.
3. All piping from the Vaporstream unit to the steam outlet is stainless steel pipe. Depending on the application, interconnecting piping from the steam outlet to the dispersion assembly can be tubing, pipe or DRI-STEEM vapor hose. See the *Dispersion* section of this document for more information about connecting to the dispersion assembly.
4. A separate 15 amp, 120 VAC service must be brought to the outdoor enclosure to power the enclosure heaters and fans.

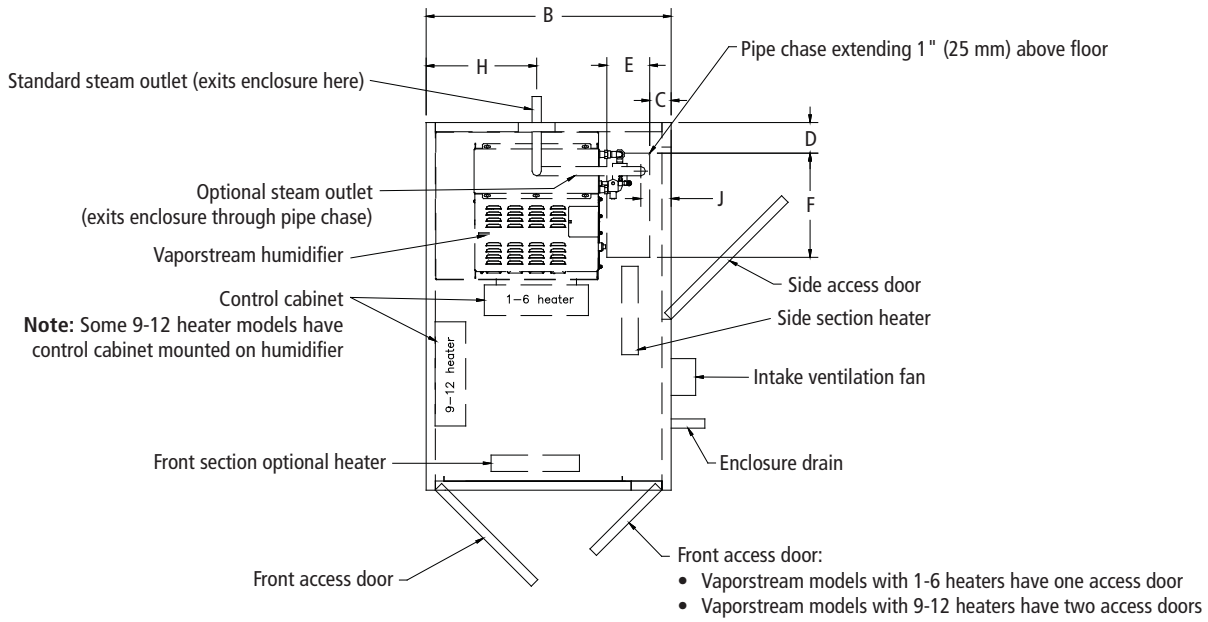
Table 18-1:
Vaporstream outdoor enclosure dimensions*

Item	Description	Vaporstream models			
		with 1-6 heaters		with 9-12 heaters	
		inches	mm	inches	mm
A	Enclosure height	56.00	1422	56.00	1422
B	Enclosure width	40.00	1016	54.00	1372
C	Pipe chase position	2.50	67	2.50	67
D		2.50	64	2.50	64
E	Pipe chase size	8.00	203	8.00	203
F		19.50	495	19.50	495
G	Steam pipe position	13.50	343	13.50	343
H		22.00	559	29.50	899
J		7.00	178	7.00	178
K		8.25	210	9.25	235
L	Length	60.00	1524	64.00	1626

* See drawings above and on facing page.

mc_030410_1520

Figure 19-1:
Vaporstream outdoor enclosure, top view



mc_030410_1505

DC-1482

Table 19-1:
Vaporstream outdoor enclosure connection sizes

Description	All Vaporstream models
Water makeup (fill)	¼" pipe thread (DN8)
Drain	¾" (DN20)
Condensate return	¾" pipe thread (DN20)

mc_030410_1101

Notes:

- See Table 8-1 for capacities and input requirements.
- Add 15 full load amps (120 VAC) when using an outdoor enclosure with a heater package.
- Add 2 full load amps (120 VAC) when using an outdoor enclosure without a heater package.

Table 19-2:
Vaporstream outdoor enclosure weights

Vaporstream model	Number of heaters	Outdoor enclosure shipping weight*		Outdoor enclosure operating weight*	
		lbs	kg	lbs	kg
2-1, 3-1, 4-1, 5-1	1	485	220	530	240
6-1, 9-1, 12-1, 16-1, 21-1, 25-1	3	515	234	620	281
12-2, 18-2, 24-2, 32-2, 42-2, 50-2	6	535	243	690	313
18-3, 27-3, 36-3, 48-3, 63-3, 75-3	9	860	390	1090	494
24-4, 36-4, 48-4, 64-4, 84-4, 100-4	12	910	413	1190	540

* Includes humidifier

mc_030410_1100

Vaporstream weather cover

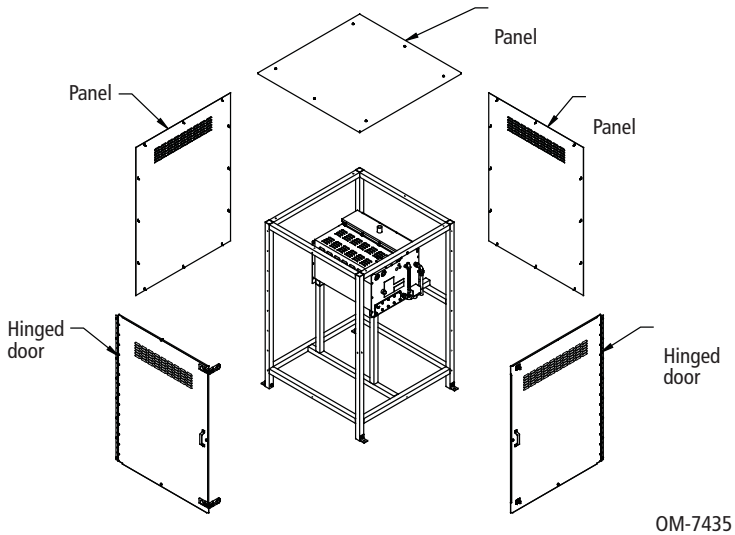
Table 20-1:
Weather cover weights

Weather cover size	Weight*	
	lbs	kg
1-heater	390	177
3-heater	395	179
6-heater	430	195
9-heater	465	211
12-heater	500	227
* Weight does not include humidifier or control cabinet.		

mc_030210_0950

The optional Vaporstream weather cover is water-resistant and designed to protect the humidifier from rain and sun. The weather cover has been tested and approved by ETL Testing Laboratories, Inc., and is listed to UL Standard 1995 and certified to CAN/CSA Standard C22.2 No. 236.

Figure 20-1:
Weather cover exploded view



mc_020110_1255

Figure 20-2:
Weather cover dimensions

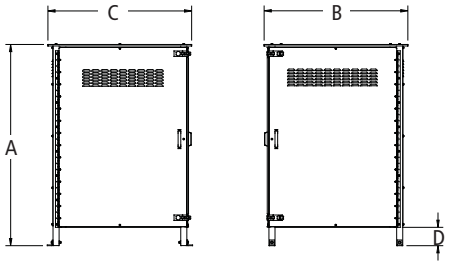


Table 20-2:
Weather cover dimensions

Letter	Description	1-heater and 3-heater covers		6-heater cover		9-heater cover		12-heater cover	
		inches	mm	inches	mm	inches	mm	inches	mm
A	Height	66	1676	66	1676	66	1676	66	1676
B	Length	44	1118	44	1118	44	1118	44	1118
C	Width	35	889	39	991	44	1118	50	1270
D	Distance from bottom	6	152	6	152	6	152	6	152

mc_022310_1645

Drip-free dispersion basics

Guaranteed non-wetting distances

Using data collected in our on-site test lab, we have developed guaranteed steam absorption (non-wetting) distances. Performance charts allow you to confidently choose equipment that will accommodate any application.

Dry steam

Adding humidification to an airstream without creating wetness in the duct system is critical for the maintenance of a healthy environment. Wet areas in ducts are a threat to the health of building occupants since they moisten dust on duct floors, creating ideal breeding grounds for disease-producing microbes. In addition, water accumulating in ducts can drip and cause building damage.

Steam exits drip-free through tubelets

All DRI-STEEM evaporative dispersion tube units discharge steam through thermal-resin tubelets fitted into dispersion tubes. These tubelets extend from the center of the tube, where the steam is driest, through the tube wall, to the duct airstream. In essence, the tubelets provide a temperature-neutral exit tunnel for steam, allowing steam to cross over lower-temperature metal without condensing or dripping. Each tubelet contains a calibrated orifice sized for steam capacity. These tubelets are a DRI-STEEM exclusive, and are essential for drip-free steam dispersion.

Condensate drains away

Some condensation is inevitable in steam dispersion, but through careful design, condensate can be controlled and directed away from where it can cause problems.

For example, the Ultra-sorb dispersion panel has a unique double-header design that uses gravity to remove condensate. Steam enters the supply header, exits through the tubelets, and condensate drains out the return header. In the Rapid-sorb dispersion unit, steam enters one end of a single bottom header with velocities carefully managed so that condensate is not pushed out into the air along with the steam; it drains out at the opposite end of the header.

Reduce condensate, wasted energy with high-efficiency tubes

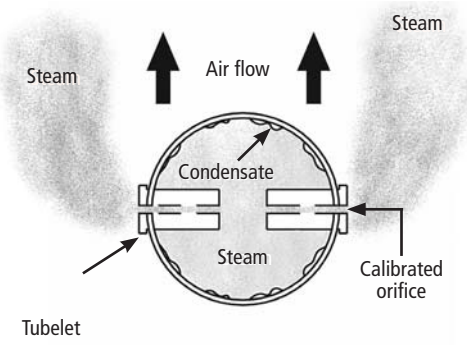
To significantly reduce condensate and wasted energy, use DRI-STEEM's high-efficiency tubes, which reduce dispersion-generated condensate and wasted energy by up to 85%. See *High-efficiency Tube option* on page 22.

For more about dispersion, see Pages 22 – 31.

Figure 21-1:
DRI-STEEM dispersion tubes

DRI-STEEM's dispersion tubes are fitted with one or two rows of closely-spaced thermal-resin tubelets to evenly disperse steam across the airstream.

Figure 21-2:
DRI-STEEM tubelets

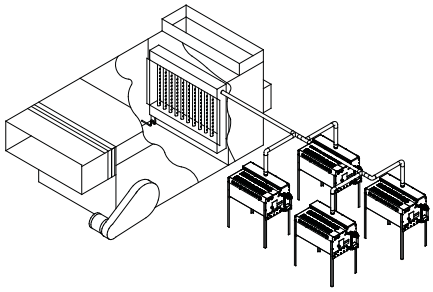


DRI-STEEM's unique tubelets extend into the center of the tube so only the driest steam is discharged into the air.

OM-150a

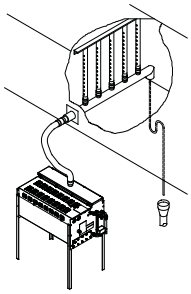
Vaporstream steam dispersion options

Figure 22-1:
Ultra-sorb dispersion



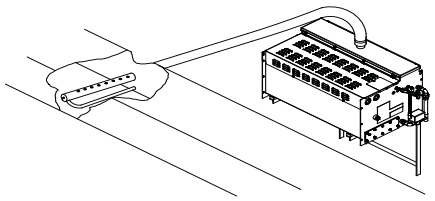
VLC-OM-13

Figure 22-2:
Rapid-sorb dispersion



VLC-OM-14

Figure 22-3:
Single or multiple tube dispersion



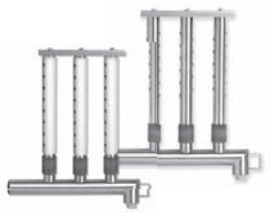
VLC-OM-15

Ultra-sorb®

- Double-header design
- Shortest non-wetting distance; install within inches of upstream dampers, coils, or elbows without dripping
- Steam capacity up to 1,850 lbs/hr (839 kg/h)
- Factory assembled for easy installation
- High-efficiency tube option

Rapid-sorb®

- Single-header design
- Short non-wetting distance
- Steam capacity up to 800 lbs/hr (363 kg/h)
- Assembled on-site
- High-efficiency tube option



Single or multiple tubes

- Horizontal or vertical airflow
- Available with or without condensate drain
- Steam capacity up to 85 lbs/hr (39 kg/h)

High-efficiency Tube option

- Up to 85% reduction in wasted energy, airstream heat gain, and condensate production
- PVDF insulation is plenum-approved for in-duct installation
- Will not absorb water or support microbial growth; has a closed-cell structure
- Available on Ultra-sorb and Rapid-sorb

mc_042710_1345-NA

Ultra-sorb panel with high-efficiency tubes

Vaporstream steam dispersion options

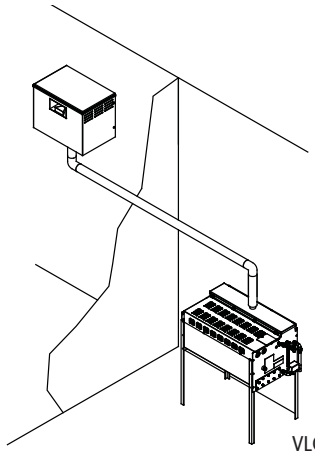
Space Distribution Units (SDUs)

- For remotely dispersing steam into large open spaces
- Designed for use in finished spaces
- Useful where there are no air ducts
- SDU-E: external absorption at capacities up to 102 lbs/hr (46.3 kg/h)
- SDU-I: internal absorption at capacities up to 30 lbs/hr (13.6 kg/h)

Area-type™

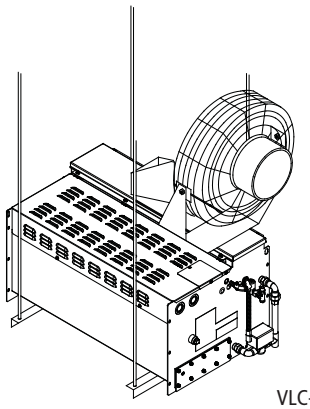
- Disperses steam in large open spaces
- Use where there are no air-handling ducts
- Steam is dispersed quietly without introducing water droplets into the air

Figure 23-1:
Space Distribution Unit (SDU) dispersion



VLC-OM-16

Figure 23-2:
Area-type dispersion



VLC-OM-17

Calculating non-wetting distances

Guaranteed absorption

- Cataloged and guaranteed steam absorption distances
- Unique tubelets in dispersion tubes eliminate condensate drips
- Published absorption tables for sizing and selecting the correct dispersion option
- Dri-calc® software available for system selection and absorption distance calculations

Notes:

- Final equipment selection should account for condensate loss. See the *DRI-STEEM Design Guide* for steam loss tables.
- Dispersion assembly should accommodate maximum output capacity of humidifier.

Sample exercise

Read through this exercise to learn more about specifying a dispersion unit based on non-wetting distance. Assume you have chosen to use Ultra-sorb units because you want pre-assembled panels.

Assume the entering air is 20% RH, and the leaving air needs to be 70% RH. Design for a non-wetting distance of 24" (610 mm) maximum.

Solution

Refer to Figure 25-1. Find 20% entering RH. Proceed vertically until you intersect the 70% leaving RH line. Draw a line horizontally from that point to the right to see that for 24" (610 mm) of non-wetting distance, 6" (152 mm) tube spacing would be the closest match.

Verify capacity

From Table 25-1, note that for 6" (152 mm) spacing, maximum capacity is 18 lbs/hr/ft^2 (88 kg/h/m^2). Multiply this value by the active face area of the Ultra-sorb to determine if the unit will produce adequate output capacity. If the capacity is inadequate, go to the next smaller tube spacing.

Steam absorption considerations

1. Non-wetting distance is the dimension downstream from the leaving side of the steam dispersion assembly to the point where wetting will not occur, although wisps of steam may be present. Solid objects at duct air temperature, such as coils, dampers, fans, etc., downstream of this dimension will remain dry.
2. **CAUTION!** Non-wetting distances described in this catalog do not apply when installing a steam dispersion assembly upstream of filter media. If you need to install a steam dispersion assembly upstream of filter media, consult your representative or DRI-STEEM directly for special recommendations.
3. Note that the rise (Δ) in RH (the difference between entering and leaving RH) has a direct bearing on the non-wetting distance. As the rise increases, more vapor needs to be dispersed into the air, and thus the non-wetting distance increases.
4. Uneven airflow over the cross-section of a dispersion assembly can result in nonuniform mixing of steam with air which, in turn, will adversely affect the non-wetting distance.

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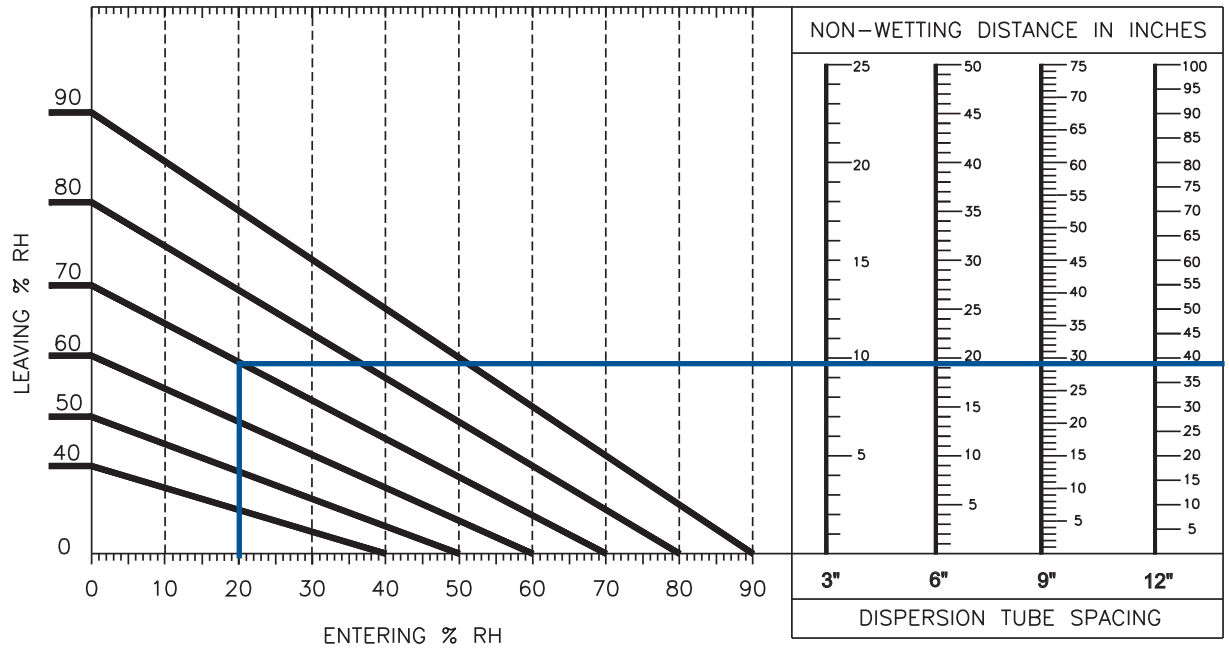
Figure 25-1:
Ultra-sorb non-wetting distances



Note:
The above data apply to all air velocities up to 1,500 fpm (7.6 m/s), and are based on air leaving the zone of humidification at conditions of 55 °F (13 °C) and the stated % RH. The blue lines in the graph refer to the sample exercise described on Page "Sample exercise" on page 24.

mc_042710_0900

Table 25-1:
Ultra-sorb tube spacing and capacity

Tube spacing		Maximum capacity	
inches	mm	lbs/hr/ft²	kg/h/m²
3	76	36	175
6	152	18	88
9	229	12	59
12	305	9	44

Note:
The above steam flow capacity data are based on pounds (kg) of steam per hour per square foot (meter) of face area, exclusive of headers, at various tube spacings.

mc_042710_0905

Ultra-sorb dimensions

Ultra-sorb LV

- Vertical dispersion tubes
- Suitable for AHUs or ductwork
- Use when duct height is greater than duct width
- May use with pressurized or evaporative steam (horizontal airflow only)

For Ultra-sorb Model LH (horizontal tubes), see the *Ultra-sorb Steam Dispersion Panels Product Catalog* (available at www.dristeem.com).

Figure 26-1:
Ultra-sorb LV dimensions

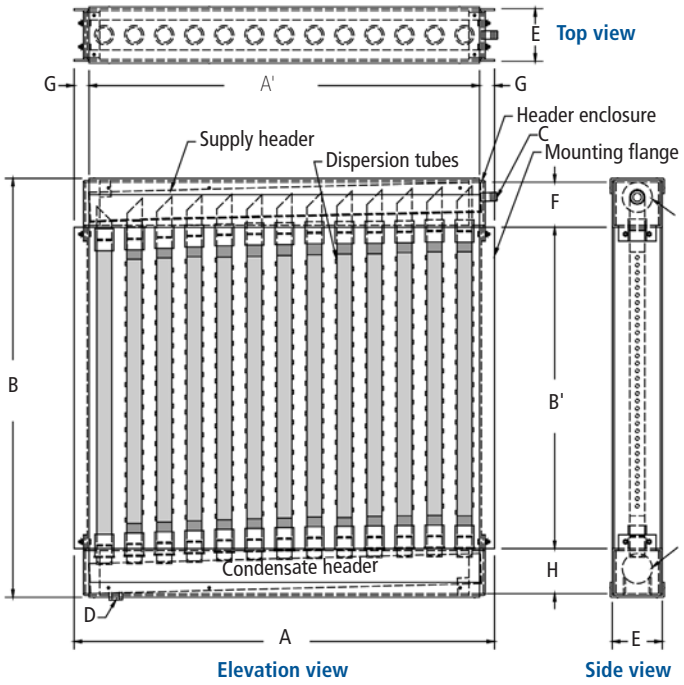


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Table 26-1:
Evaporative steam header capacities

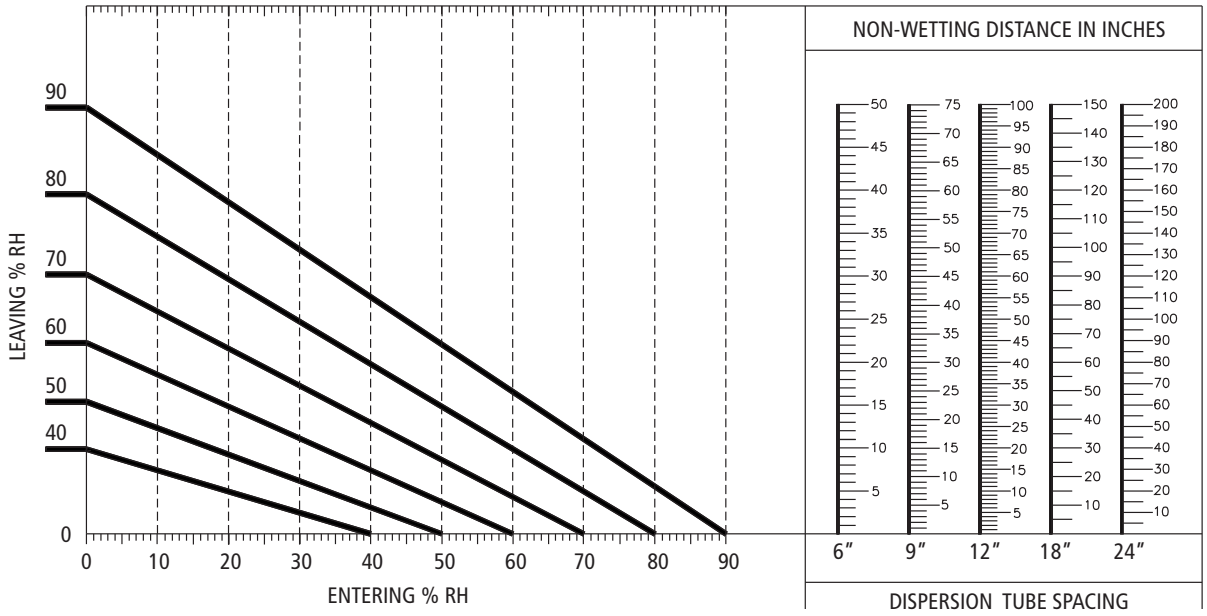
Header capacity		Header diameter	
lbs/hr	kg/h	inches	DN
300	135	3	80
600	270	4	100
1100	500	5	125
1850	820	6	150

Table 26-2:
Ultra-sorb LV dimensions

Dimension	Inches (mm)
A Overall width	15" (380) min, 147" (3735) max, in 1" (25) increments
A' Face width	12" (305) min, 144" (3660) max, in 1" (25) increments
B Overall height	21" (530) min, 156" (3960) max, in 1" (25) increments Panels with overall height more than 98" (2490 mm) are shipped unassembled.
B' Face height	12" (305) min, 144" (3660) max, in 1" (25) increments
C Steam inlet diameter	Determined by maximum steam capacity
D Condensate drain	¾" pipe thread (DN20)
E Header enclosure (front to back)	For 3" (DN80) and 4" (DN100) headers, E = 5" (127); for 5" (DN125) header, E = 6" (152); for 6" (DN150) header, E = 7" (178)
F Header enclosure (top to bottom)	For 3" (DN80) header F = 4.5" (114); for 4" (DN100) header, F = 5.5" (140); for 5" (DN125) header, F = 6.5" (165); for 6" (DN150) header F = 7.5" (191)
G Flange	1.5" (38)
H Condensate header enclosure	4.5" (114)
Note: Header dimensions are determined by capacity. See Table 26-1.	

mc_050808_1215

Figure 27-1:
Rapid-sorb non-wetting distances



Note:
The above data apply to all air velocities up to 1,500 fpm (7.6 m/s) and are based on air leaving the zone of humidification at 55 °F (13 °C) and the stated % RH.

Table 27-1:
Rapid-sorb header capacities

Header capacity		Header diameter	
lbs/hr	kg/h	inches	DN
≤250	≤113	2	50
251-500	114-227	3	80
501-800	228-363	4	100

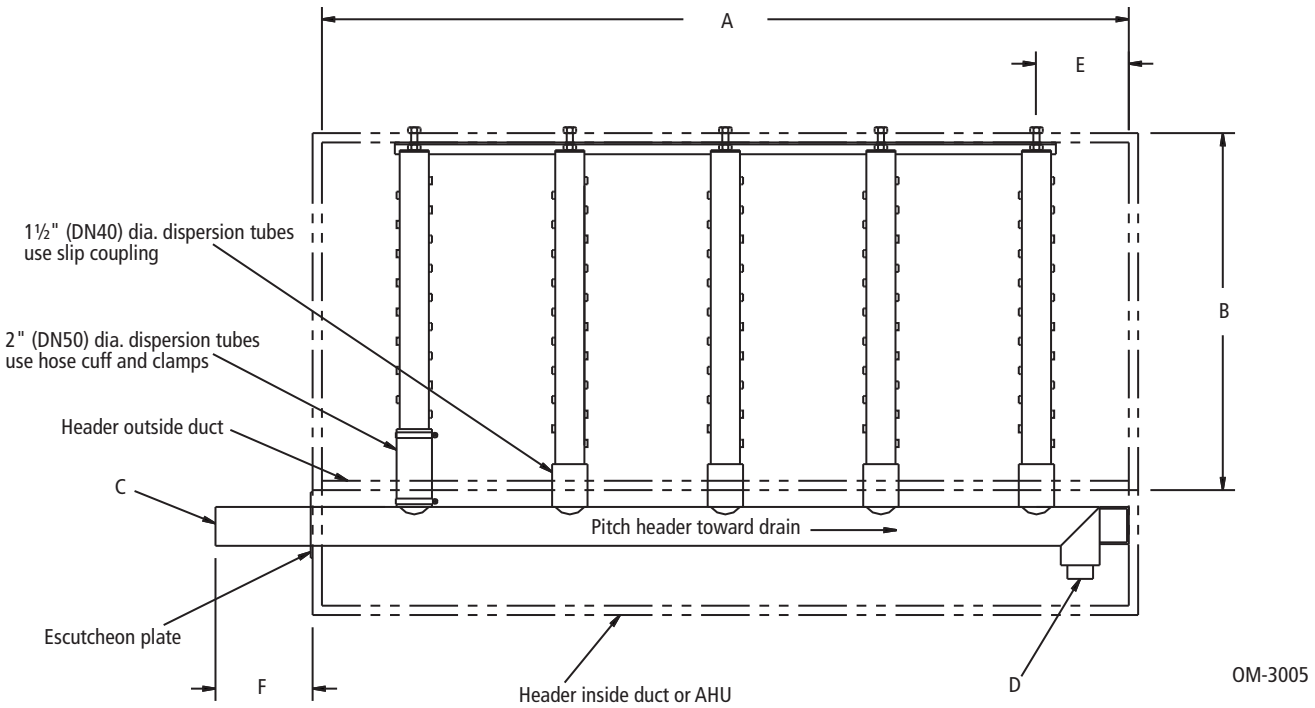
Table 27-2:
Rapid-sorb dispersion tube capacities*

Tube capacity		Tube diameter	
lbs/hr	kg/h	inches	DN
≤35	≤16	1½	40
36-70	17-32	2	50

* If duct height is <15" (381 mm), tube quantities may need to increase to compensate for reduced capacity of short tubes. Consult DRI-STEEM or see Dri-calc for the correct calculation.

mc_042710_1410

Figure 28-1:
Rapid-sorb dimensions



Note:
Add water seal to condensate drain as shown in the Dri-calc Installation Guides or the humidifier's Installation, Operation, and Maintenance manual.

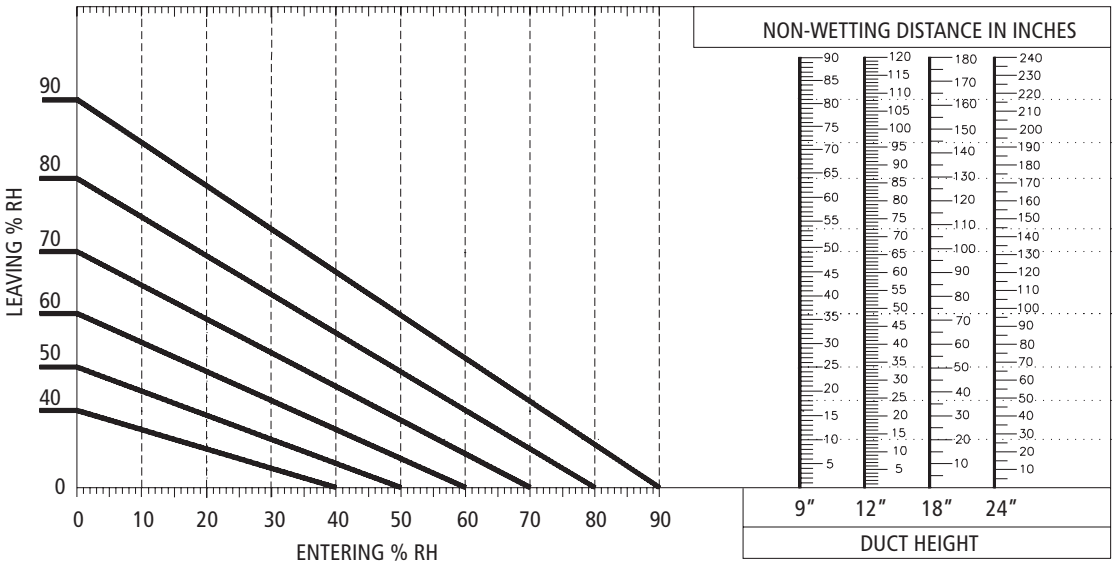
Table 28-1:
Rapid-sorb dimensions

Dimension	Description	Inches (mm)
A	Face width	12" (305) minimum to 120" (3048) maximum in 1" (25) increments
B	Face height	12" (305) minimum to 120" (3048) maximum in 1" (25) increments
C	Steam inlet	Determined by humidifier maximum capacity
D	Condensate drain	¾" pipe thread (DN20)
E	Distance from tube center to inside of duct or AHU wall	4.5" (114) minimum
F	Distance from outside of duct or AHU wall to end of Rapid-sorb leader	4.5" (114) minimum

Note:
All Rapid-sorb units are custom-sized and field-assembled to fit the duct or air handler. Consult DRI-STEEM for sizes larger or smaller than those listed above.

mc_042710_1415

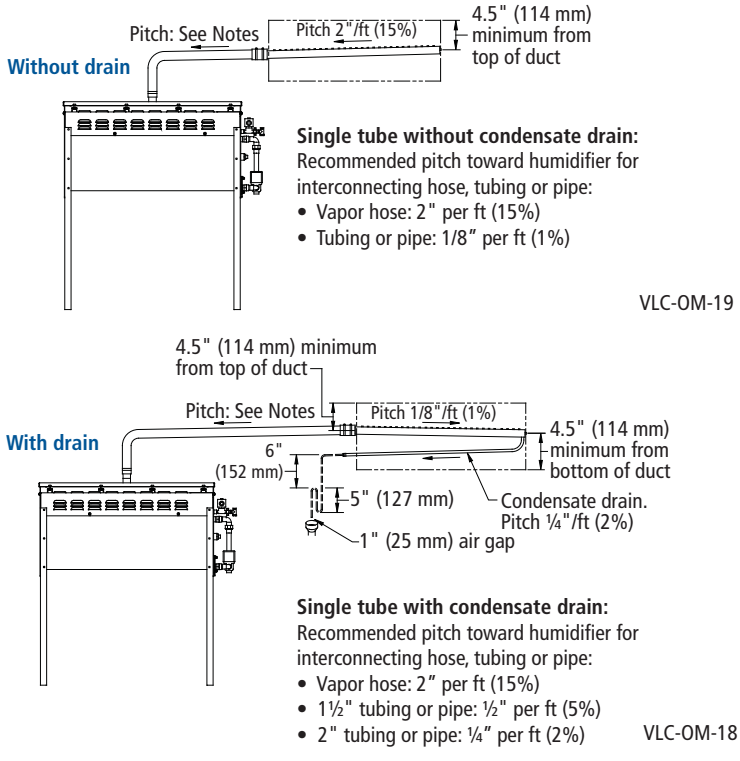
Figure 29-1: Single tube non-wetting distances



Note:
The above data apply to all air velocities up to 1,500 fpm (7.6 m/s) and is based on air leaving the zone of humidification at 55 °F (13 °C) and the stated % RH.

mc_042710_1417

Figure 29-2: Single tube without and with condensate drain


Without drain
Pitch: See Notes
Pitch 2"/ft (15%)
4.5" (114 mm) minimum from top of duct
With drain
4.5" (114 mm) minimum from top of duct
Pitch: See Notes
Pitch 1/8"/ft (1%)
4.5" (114 mm) minimum from bottom of duct
6" (152 mm)
5" (127 mm)
Condensate drain. Pitch ¼"/ft (2%)
1" (25 mm) air gap

Single tube without condensate drain:
Recommended pitch toward humidifier for interconnecting hose, tubing or pipe:
- Vapor hose: 2" per ft (15%)
- Tubing or pipe: 1/8″ per ft (1%)

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Single tube with condensate drain:
Recommended pitch toward humidifier for interconnecting hose, tubing or pipe:
- Vapor hose: 2″ per ft (15%)
- 1½" tubing or pipe: ½" per ft (5%)
- 2" tubing or pipe: ¼″ per ft (2%)

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Table 29-1: Single tube capacities

Tube size		Capacity			
		Without drain		With drain	
inches	DN	lbs/hr	kg/h	lbs/hr	kg/h
1½	40	28.4	13	56.8	25.8
2	50	56.8	25.8	85.2	38.6

mc_042710_1416

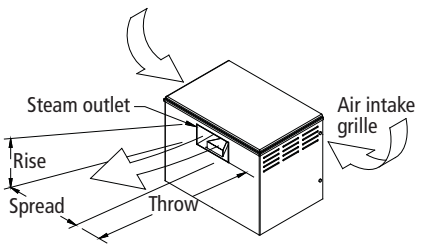
Table 30-1: SDU-E minimum nonwetting distances

kW	Maximum steam capacity		40% RH @ 70 °F (21 °C)						50% RH @ 70 °F (21 °C)						60% RH @ 70 °F (21 °C)					
			Rise		Spread		Throw		Rise		Spread		Throw		Rise		Spread		Throw	
	lbs/hr	kg/h	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
2	6	2.7	1.0	0.3	1.0	0.3	5.0	1.5	1.5	0.5	1.5	0.5	6.5	2.0	2.5	0.8	2.5	0.8	7.5	2.3
4	12	5.4	1.0	0.3	1.0	0.3	5.0	1.5	1.5	0.5	1.5	0.5	6.5	2.0	2.5	0.8	2.5	0.8	7.5	2.3
6	18	8.2	1.0	0.3	1.0	0.3	5.0	1.5	1.5	0.5	1.5	0.5	6.5	2.0	2.5	0.8	2.5	0.8	7.5	2.3
8	24	10.9	1.0	0.3	1.0	0.3	5.5	1.7	1.5	0.5	1.5	0.5	6.5	2.0	2.5	0.8	2.5	0.8	7.5	2.3
10	30	13.6	1.5	0.5	1.5	0.5	6.0	1.8	2.0	0.6	2.0	0.6	7.0	2.1	3.0	1.0	3.0	1.0	8.0	2.5
12	36	16.3	1.5	0.5	1.5	0.5	6.0	1.8	2.0	0.6	2.0	0.6	7.0	2.1	3.0	1.0	3.0	1.0	8.0	2.5
14	42	19.1	2.0	0.6	2.0	0.6	7.0	2.1	2.0	0.6	2.0	0.6	7.0	2.1	3.0	1.0	3.0	1.0	9.0	2.7
16	48	21.8	2.0	0.6	2.0	0.6	7.0	2.1	2.0	0.6	2.0	0.6	7.0	2.1	3.0	1.0	3.0	1.0	9.0	2.7
21	63	28.6	2.0	0.6	2.0	0.6	7.5	2.3	2.5	0.8	2.5	0.8	10.0	3.0	3.0	1.0	3.0	1.0	12.0	3.7
25	75	34.0	2.0	0.6	2.0	0.6	8.0	2.5	2.5	0.8	2.5	0.8	10.5	3.2	3.5	1.1	3.5	1.1	12.5	3.8
30	90	40.9	2.0	0.6	2.0	0.6	8.0	2.5	2.5	0.8	2.5	0.8	10.5	3.2	3.5	1.1	3.5	1.1	12.5	3.8
34	102	46.3	2.0	0.6	2.0	0.6	8.0	2.5	2.5	0.8	2.5	0.8	10.5	3.2	3.5	1.1	3.5	1.1	12.5	3.8

Notes:
- Surfaces or objects directly in the path of vapor discharge may cause condensation and dripping.
- To avoid steam impingement on surrounding areas, observe the minimum nonwetting dimensions in this table.
- Rise: The minimum nonwetting height above the steam outlet of the SDU-E.
- Spread: The minimum nonwetting width from the steam outlet of the SDU-E.
- Throw: The minimum nonwetting horizontal distance from the steam outlet of the SDU-E.

mc_042710_1300

Figure 30-1: SDU-E rise, spread and throw



mc_042710_1435 DC-1027

Table 30-2: Space Distribution Unit specifications**

SDU model	Maximum capacity		Shipping weight		Amps at 120V (50/60 Hz)	Horsepower	cfm	m^3/s	dB*
	lbs/hr	kg/h	lbs	kg					
SDU-E	102	46.3	61	28	2.07	1/8	545	0.26	64
SDU-I	30	13.6	68	31	3.20	1/5	760	0.36	58

* Measurement taken 6.5' (2 m) in front of SDU cabinet.
** For visible vapor to be absorbed completely within the SDU-I unit before being discharged as humidified air, room air must be 45% RH or less. Trying to maintain greater than 45% RH will cause visible vapor and potential for moisture collection on the discharge grille.

mc_042710_1440

Area-type dispersion

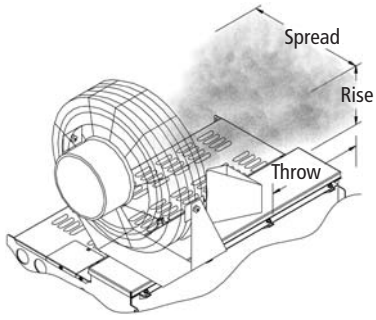
Table 31-1:
Area-type (evaporative steam) minimum non-wetting distances*

Maximum steam capacity		60 °F (16 °C)																	
		30% RH						40% RH						50% RH					
		Rise		Spread		Throw		Rise		Spread		Throw		Rise		Spread		Throw	
lbs/hr	kg/h	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
50	20	1.0	0.3	2.0	0.6	6.0	1.8	1.0	0.3	2.0	0.6	6.0	1.8	1.0	0.3	2.5	0.8	6.0	1.8
75	34	3.0	0.9	3.0	0.9	8.0	2.4	3.0	0.9	3.0	0.9	8.0	2.4	3.0	0.9	4.0	1.2	8.0	2.4
100	45	4.0	1.2	4.0	1.2	10.0	3.1	4.0	1.2	4.0	1.2	10.0	3.1	4.0	1.2	5.0	1.5	10.0	3.1
150	68	6.0	1.8	5.0	1.5	12.0	3.7	6.0	1.8	5.0	1.5	12.0	3.7	6.0	1.8	5.0	1.5	12.0	3.7
200	90	7.0	2.1	7.0	2.1	13.0	4.0	8.0	2.4	7.0	2.1	14.0	4.3	8.0	2.4	7.0	2.1	14.0	4.3
225	102	7.0	2.1	7.0	2.1	13.0	4.0	8.0	2.4	7.0	2.1	14.0	4.3	8.0	2.4	7.0	2.1	14.0	4.3
250	110	8.0	2.4	8.0	2.4	15.0	4.6	9.0	2.7	9.0	2.7	16.0	4.9	9.0	2.7	9.0	2.7	16.0	4.9
285	130	9.0	2.7	9.0	2.7	17.0	5.2	10.0	3.1	10.0	3.1	18.0	5.5	10.0	3.1	10.0	3.1	18.0	5.5
300	136	9.0	2.7	9.0	2.7	17.0	5.2	10.0	3.1	10.0	3.1	18.0	5.5	10.0	3.1	10.0	3.1	18.0	5.5

Maximum steam capacity		70 °F (16 °C)																	
		30% RH						40% RH						50% RH					
		Rise		Spread		Throw		Rise		Spread		Throw		Rise		Spread		Throw	
lbs/hr	kg/h	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
50	20	1.0	0.3	1.5	0.5	4.0	1.2	1.0	0.3	2.0	0.6	4.0	1.2	1.0	0.3	2.0	0.6	4.0	1.2
75	34	2.0	0.6	2.0	0.6	6.0	1.8	2.0	0.6	2.5	0.8	6.0	1.8	2.0	0.6	2.5	0.8	6.0	1.8
100	45	3.0	0.9	3.0	0.9	8.0	2.4	3.0	0.9	3.0	0.9	8.0	2.4	3.0	0.9	3.0	0.9	8.0	2.4
150	68	4.0	1.2	4.0	1.2	10.0	3.1	4.0	1.2	4.0	1.2	11.0	3.4	4.0	1.2	4.0	1.2	11.0	3.4
200	90	5.0	1.5	5.0	1.5	11.0	3.4	5.0	1.5	5.0	1.5	12.0	3.7	5.0	1.5	5.0	1.5	12.0	3.7
225	102	5.0	1.5	5.0	1.5	11.0	3.4	5.0	1.5	5.0	1.5	12.0	3.7	5.0	1.5	5.0	1.5	12.0	3.7
250	110	6.0	1.8	6.0	1.8	12.0	3.7	6.0	1.8	6.0	1.8	13.0	4.0	6.0	1.8	6.0	1.8	14.0	4.3
285	130	7.0	2.1	7.0	2.1	14.0	4.3	7.0	2.1	7.0	2.1	15.0	4.6	7.0	2.1	7.0	2.1	16.0	4.9
300	136	7.0	2.1	7.0	2.1	14.0	4.3	7.0	2.1	7.0	2.1	15.0	4.6	7.0	2.1	7.0	2.1	16.0	4.9

* With fan on high speed

Figure 31-1:
Area-type rise, spread, throw



Spread: Minimum non-wetting width from the steam chute

Rise: Minimum non-wetting height above the steam chute

Throw: Minimum non-wetting horizontal distance from the steam chute

VLC-OM-020

mc_030210_0940

Table 31-2:
Area-type electric fan specifications*

Motor	120 V, 50/60 Hz
Blade diameter	18" (457 mm)
Speeds	3
Control	Rotary switch
cfm (high speed)	3190
m^3/s (high speed)	1.51
rpm (high speed)	1500
Amps (high speed)	1.52

Conserving resources through better performance

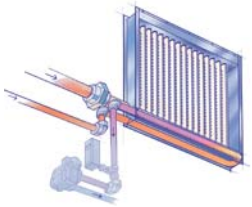
DRI-STEEM conserves resources by designing humidification systems that optimize performance. Systems that perform well save energy and water and, ultimately, cost less to operate and maintain.

Save energy

For applications requiring short absorption, high-efficiency dispersion tubes reduce wasted energy up to 85% by significantly reducing airstream heat gain and condensate production. Available for new and retrofit Ultra-sorb® and Rapid-sorb® steam dispersion panels.

For warm, dry applications, DRI-STEEM's High-Pressure Atomizing System disperses unheated micro-fine water particles into airstreams or open spaces. As atomized water droplets evaporate, air temperature drops, reducing the cooling load. This provides significant energy savings when humidifying and cooling simultaneously.

Save water



Ultra-sorb Model XV eliminates water waste and reduces airstream heat gain, energy costs, and boiler chemical use. Available for all pressurized steam applications.

Optimize performance

DRI-STEEM's most advanced controller, Vapor-logic®4 continuously monitors space conditions to align humidifier output with demand. The result is accurate, responsive control.

Your DRI-STEEM representative is:

Expect quality from the industry leader

For more than 45 years, DRI-STEEM has been leading the industry with creative and reliable humidification solutions. Our focus on quality is evident in the construction of the Vaporstream humidifier, which features cleanable, stainless steel construction. DRI-STEEM also leads the industry with a Two-year Limited Warranty and optional extended warranty.

For more information

www.dristeem.com
sales@dristeem.com

For the most recent production information visit our web site:
www.dristeem.com

DRI-STEEM Corporation
An ISO 9001:2000 certified company

U.S. Headquarters:
14949 Technology Drive
Eden Prairie, MN 55344
800-328-4447 or 952-949-2415
952-229-3200 (fax)

European office:
Marc Briers
Grote Hellekensstraat 54 b
B-3520 Zonhoven
Belgium
+3211823595 (voice)
+3211817948 (fax)
E-mail: marc.briers@dristeem.com

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Ultra-sorb is covered by the following Patents, with additional patents pending: United States Patent numbers 5,126,080; 5,277,849; 5,372,753; 5,376,312; 5,543,090

Clean room cover image courtesy of Rakon Limited.

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